DETAILS OF THE WEATHER IN THE UNITED STATES.

GENERAL CONDITIONS.

A. J. HENRY.

No feature of August weather stands out as exceptional; the three elements, pressure, temperature, and precipitation were in fairly close accord with normal conditions, excepting only the last named. The distribution of precipitation was quite irregular and local; on the whole it was a dry month, although more or less extensive areas of positive departure may be found in all parts of the country. On the Pacific coast and over the Plateau region, where August precipitation is normally small in amount, the departures were very generally positive. The drought was most severe in the Plains States and Texas.

CYCLONES AND ANTICYCLONES.

By W. P. DAY.

As usual, at this time of the year, the majority of the anticyclones were traced back to the North Pacific. The southern portions of these high-pressure waves are generally broken up and retarded on passing into the low-pressure belt over the Rocky Mountain region, while the northern portions are carried along more rapidly in the general circulation and lose less strength, appearing farther east as Alberta or Hudson Bay anticyclones at the time the southern portion of the original wave is disintegrating over the eastern slope of the Rockies. These pseudo Alberta and Hudson Bay anticyclones resemble the original from the North Pacific. The true Alberta anticyclone with its underrunning wedge of cold air should not be expected until there is a real accumulation of cold over the polar regions with the waning of summer.

Low-pressure areas were numerous but not important. No tropical cyclones were noted in this area of the western Atlantic.

CYCLONES.	Alberta.	North Pacific.	South Pacific.	Northern Rocky Mountain.	Colorado.	Texas.	East Gulf.	South Atlantic.	Central.	Total.
August, 1922	7.0	.....	.....	1.0	.....	.....	1.0	1.0	4.0	14.0
Average number 1892-1912, inclusive	4.2	0.6	0.3	0.9	1.0	0.2	0.1	0.1	1.0	8.4

ANTICYCLONES.	North Pacific.	South Pacific.	Alberta.	Plateau and Rocky Mountain region.	Hudson Bay.	Total.
August, 1922	4.0	.....	2.0	.....	2.0	8.0
Average number 1892-1912, inclusive	1.8	0.2	3.0	0.9	0.8	6.7

FREE-AIR CONDITIONS.

By L. T. SAMUELS, Meteorologist.

Mean temperatures were above the average at the four western kite stations at practically all levels (Table 1). Negative departures found at the surface and lower levels at Broken Arrow and Drexel, while not in agreement with surface-temperature departures as shown in climatological Chart III, may be explained as being a result of those kite flights made during the early morning hours and those in the later evening on a large portion of the days, at which times, only, favorable wind conditions existed. Negative departures were found at all levels at Royal Center and Due West. It will be noted that at Drexel and Ellendale, where temperature departures were positive (and moderately large at the latter station) the resultant winds for the month had a smaller southerly component than normally, a condition not often found. (See Table 2.) The percentage of sunshine for the month at these stations, however, was 77 per cent and 85 per cent, respectively, both amounts considerably exceeding any previous August for which records have been obtained. During the hot period in the south-central portion of the country in the latter part of the month when surface temperatures as high as 41° C were reported (on the 24th) at various points in this section, free-air temperatures at Broken Arrow exceeded all previous records at that station from the 1,000 to the 3,000 meter levels.

Relative humidities did not differ greatly from their average values excepting in the upper levels at Drexel, where they were over 20 per cent higher.

Vapor pressure departures conformed generally with those for temperature.

A calm period prevailed at Royal Center from the 9th to the 19th, inclusive, when winds remained too light to sustain kites. During the month only four single-theodolite pilot-balloon observations showed winds exceeding 30 m. p. s. These were as follows:

Station.	Date.	Velocity.	Direction	Altitude.
		M. p. s.		*Meters.*
Ellendale, N. Dak	23	30	w	8,200
Do	24	33	w	2,800
Ithaca, N. Y	26	36	wsw	5,700
Madison, Wis	10	36	n	8,200

Easterly winds above 10 km. were observed as follows:

Station.	Date.
Aberdeen, Md	15
Bolling Field, D. C	17, 18
Broken Arrow, Okla	31
Camp Bragg, N. C	22
Drexel, Nebr	16
Groesbeck, Tex	2, 5, 6, 7, 28, 31
Key West, Fla	5, 24, 25, 31
Royal Center, Ind	14, 17
Washington, D. C	15, 16, 17, 18

A record pilot-balloon observation was made at Washington, D. C., on the 17th when an altitude of 22,590 m. was reached. At Broken Arrow on the 31st the balloon was observed to a height of 18,090 m. Both of these observations were made with a single theodolite and must therefore be accepted with reservation, at least for the upper levels. The record for Washington showed very light winds to 10 km. increasing from this elevation to a maximum of 19 m. p. s. at 12 km., above which they averaged between 8 and 14 m. p. s. The direction was westerly at the surface and backed to northeasterly at 10 km. where it remained to the highest altitude. At Broken Arrow the velocities averaged less than 10 m. p. s. throughout the observation. The direction was southwesterly at the surface, veering to northwesterly at 3 km. where it remained up to 14 km., then veered sharply until calm conditions were found at the highest levels.

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during August, 1922.*

TEMPERATURE (°C.).

Altitude, M. S. L. (m.)	Broken Arrow, Okla. (233m.)		Drexel, Nebr. (396m.)		Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)		Groesbeck, Tex. (141m.)		Royal Center, Ind. (225m.)	
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
Surface	25.3	−1.3	22.6	−0.1	24.5	−0.3	23.1	+2.0	27.9	+1.3	22.5	−1.4
250	25.3	−1.2	.....	.....	24.2	−0.2	.....	.....	27.1	+1.4	22.3	−1.4
500	24.8	−0.1	22.0	−0.3	21.8	−0.1	23.0	+2.1	25.8	+1.8	20.0	−1.5
750	23.9	+0.3	21.8	+0.4	20.0	−0.1	22.1	+2.1	24.5	+1.6	18.4	−1.4
1,000	22.7	+0.3	21.1	+0.7	18.5	−0.3	20.8	+2.0	23.1	+1.3	17.0	−1.3
1,250	21.2	+0.3	20.1	+0.9	17.1	−0.3	19.5	+2.1	21.5	+1.0	15.5	−1.3
1,500	19.8	+0.5	18.5	+0.7	15.6	−0.3	18.2	+2.3	19.9	+0.9	14.1	−1.2
2,000	16.6	+0.8	15.4	+0.7	12.5	−0.5	15.3	+2.4	16.5	+0.	11.0	−1.4
2,500	13.4	+0.8	12.5	+1.1	9.6	−0.2	12.7	+2.7	13.2	+0.2	8.4	−1.5
3,000	10.6	+1.0	9.4	+1.5	6.5	−0.4	10.5	+3.3	10.0	−0.2	5.3	−2.0
3,500	7.5	+0.9	5.6	+1.0	2.7	−1.3	8.1	+3.7	10.0	+2.0	2.7	−2.0
4,000	.....	.....	1.9	+0.7	−1.3	−1.9	6.0	+4.6	9.1	+3.5	0.2	−2.0
4,500	.....	.....	−2.1	+0.3	−4.6	−2.4	4.4	+6.2	5.6	+3.5	.....	.....
5,000	.....	.....	−6.4	−0.2	.....	.....	2.4	+7.0	.....	.....	.....	.....

RELATIVE HUMIDITY (%).

Surface	71	+3	74	+5	70	−1	58	−5	66	−9	62	−3
250	70	+2	.....	.....	71	−1	.....	.....	66	−10	62	−3
500	62	−4	71	+5	75	0	57	−5	63	−13	65	0
750	58	−6	62	+1	77	0	54	−4	60	−10	65	−1
1,000	58	−5	58	−1	77	0	53	−4	60	−5	64	−2
1,250	58	−5	56	−2	77	−1	52	−5	62	−1	64	−3
1,500	55	−8	57	0	77	−1	52	−5	65	+2	65	−1

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during August, 1922*—Continued.

RELATIVE HUMIDITY (%)—Continued.

Altitude, M. S. L. (m.)	Broken Arrow, Okla. (233m.)		Drexel, Nebr. (396m.)		Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)		Groesbeck, Tex. (141m.)		Royal Center, Ind. (225m.)	
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
2,000	53	−11	58	+1	77	+2	52	−3	68	+5	67	+4
2,500	53	−9	57	0	73	−3	51	−1	70	+8	68	+10
3,000	49	−10	57	−1	71	−6	47	−3	71	+11	60	+9
3,500	50	−8	62	+5	69	−7	47	+1	63	+8	56	+9
4,000	.....	.....	66	+12	69	−3	45	−0	53	+10	55	+7
4,500	.....	.....	76	+22	63	−7	45	−1	53	+10	.....	.....
5,000	.....	.....	87	+28	.....	.....	.....	.....	.....	.....	.....	.....

VAPOR PRESSURE (*mb.*).

Surface	22.39	−0.84	19.82	+1.26	21.31	−0.65	15.76	+0.45	24.01	−1.76	16.63	−2.32
250	22.18	−0.87	.....	.....	21.03	−0.61	.....	.....	23.21	−1.64	16.52	−2.23
500	19.25	−1.30	18.34	+0.85	18.97	−0.34	15.63	+0.61	20.61	−1.69	15.17	−1.49
750	16.92	−1.37	15.78	+0.27	17.40	−0.38	14.20	+0.71	18.31	−1.08	13.77	−1.43
1,000	15.65	−1.05	14.19	+0.22	15.90	−0.49	12.93	+0.67	16.86	−0.10	12.31	−1.66
1,250	14.31	−0.93	13.00	+0.32	14.65	−0.49	11.83	+0.65	15.92	+0.66	11.38	−1.56
1,500	12.68	−1.12	11.95	+0.45	13.35	−0.36	10.87	+0.76	15.07	+1.00	10.45	−1.25
2,000	10.14	−1.22	9.94	+0.40	10.91	+0.01	9.08	+1.05	13.00	+1.37	8.87	−0.49
2,500	8.25	−0.61	8.00	+0.20	8.39	−0.62	7.57	+1.16	11.17	+1.52	7.56	+0.10
3,000	6.38	−0.50	6.54	+0.13	6.44	−0.89	6.15	+1.03	9.97	+1.93	5.21	−0.42
3,500	5.46	+0.08	5.54	+0.47	4.48	−1.37	5.21	+1.22	8.84	+2.41	4.13	−0.38
4,000	.....	.....	4.48	+0.65	3.20	−1.07	4.41	+1.24	7.69	+3.02	3.46	−0.35
4,500	.....	.....	3.72	+0.82	2.15	−1.34	4.22	+1.66	7.47	+3.02	.....	.....
5,000	.....	.....	2.83	+0.52	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 2.—*Free-air resultant winds (m. p. s.) during August, 1922.*

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (233m.)				Drexel, Nebr. (396m.)				Due West, S. C. (217m.)			
	Mean.		Average.		Mean.		Average.		Mean.		Average.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 8° E.	2.7	S. 4° E.	3.5	S. 5° E.	1.9	S. 14° E.	1.6	N. 66° E.	1.5	N. 70° E.	1.0
250	S. 8° E.	2.8	S. 5° E.	3.6	.....	.....	.....	.....	N. 66° E.	1.5	N. 70° E.	0.9
500	S. 6° E.	4.6	S. 5° W.	5.0	S. 10° W.	3.0	S. 7° E.	2.3	N. 46° E.	1.4	N. 42° E.	0.8
750	S. 5° E.	5.4	S. 12° W.	5.7	S. 33° W.	4.0	S. 7° W.	3.3	N. 21° E.	1.3	N. 23° E.	0.8
1,000	S. 7° W.	4.9	S. 23° W.	6.1	S. 48° W.	4.4	S. 24° W.	3.5	N. 38° E.	1.0	N. 29° E.	0.7
1,250	S. 17° W.	4.3	S. 32° W.	5.9	S. 62° W.	4.0	S. 37° W.	3.8	N. 28° E.	1.1	N. 19° W.	0.5
1,500	S. 30° W.	3.7	S. 38° W.	5.6	S. 79° W.	3.7	S. 50° W.	3.9	N. 34° W.	0.8	N. 72° W.	1.4
2,000	S. 44° W.	2.1	S. 45° W.	5.2	N. 86° W.	4.5	S. 66° W.	5.1	N. 37° W.	7.5	N. 68° W.	1.8
2,500	S. 40° W.	1.7	S. 53° W.	5.4	N. 83° W.	5.7	S. 74° W.	6.5	N. 41° W.	2.1	N. 68° W.	3.0
3,000	S. 68° W.	1.3	S. 56° W.	6.8	N. 69° W.	8.6	S. 81° W.	8.3	N. 51° W.	3.3	N. 83° W.	4.7
3,500	N. 66° W.	2.4	S. 48° W.	7.7	N. 68° W.	8.0	S. 81° W.	9.3	N. 56° W.	5.4	N. 88° W.	6.6
4,000	.....	.....	.....	.....	N. 63° W.	11.0	S. 84° W.	10.5	N. 69° W.	10.5	N. 81° W.	7.5
4,500	.....	.....	.....	.....	N. 51° W.	15.7	N. 73° W.	10.2	N. 72° W.	10.5	N. 80° W.	13.0
5,000	.....	.....	.....	.....	N. 45° W.	14.0	N. 81° W.	14.1	.....	.....	.....	.....

Altitude, m. s. l. (m.)	Ellendale, N. Dak. (444m.)				Groesbeck, Tex. (141m.)				Royal Center, Ind. (225m.)			
	Mean.		Average.		Mean.		Average.		Mean.		Average.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 61° W.	0.6	S. 31° W.	1.0	S. 6° E.	1.9	S. 17° W.	3.0	S. 77° W.	1.2	S. 61° W.	1.7
250	.....	.....	.....	.....	S. 4° W.	2.6	S. 18° W.	4.1	S. 77° W.	1.4	S. 62° W.	1.8
500	S. 48° W.	0.7	S. 28° W.	1.6	S. 19° W.	3.6	S. 25° W.	6.0	S. 89° W.	3.6	S. 63° W.	3.6
750	S. 51° W.	2.1	S. 30° W.	2.5	S. 12° W.	3.2	S. 23° W.	6.0	N. 85° W.	4.9	S. 68° W.	4.4
1,000	S. 55° W.	2.7	S. 39° W.	2.8	S. 10° W.	2.9	S. 24° W.	5.9	N. 80° W.	5.2	S. 74° W.	5.2
1,250	S. 59° W.	3.1	S. 48° W.	3.1	S. 3° W.	2.3	S. 23° W.	5.7	N. 72° W.	6.8	S. 80° W.	5.9
1,500	S. 69° W.	3.6	S. 59° W.	3.4	S. 7° E.	1.7	S. 21° W.	4.9	N. 74° W.	7.5	S. 84° W.	6.6
2,000	S. 81° W.	5.1	S. 76° W.	4.3	S. 37° E.	1.0	S. 17° W.	4.2	N. 77° W.	8.8	S. 83° W.	7.7
2,500	S. 86° W.	7.1	S. 88° W.	9.2	S. 64° E.	1.7	S. 22° W.	4.3	N. 86° W.	10.6	S. 89° W.	8.9
3,000	N. 87° W.	8.5	N. 86° W.	7.4	N. 22° E.	7.7	S. 32° W.	4.5	N. 83° W.	14.3	N. 87° W.	10.4
3,500	N. 77° W.	10.0	N. 81° W.	9.9	.....	.....	.....	.....	N. 66° W.	6.7	N. 89° W.	10.2
4,000	N. 68° W.	9.4	N. 78° W.	10.2	.....	.....	.....	.....	N. 86° W.	10.0	S. 88° W.	11.7
4,500	N. 45° W.	12.9	N. 81° W.	10.2	.....	.....	.....	.....	.....	.....	.....	.....
5,000	N. 45° W.	14.7	N. 88° W.	12.5	.....	.....	.....	.....	.....	.....	.....	.....

THE WEATHER ELEMENTS.

By P. C. DAY, Meteorologist in Charge of Division.

PRESSURE AND WINDS.

During August the first sign of approaching autumn is noted in the increased strength of the anticyclonic areas that occasionally move from the Canadian Provinces into the northern districts of the United States, particularly to eastward of the Rocky Mountains, as compared with those entering the United States during July. As a result the average atmospheric pressure for August is slightly higher as a rule than that for July over the northern half of the country from the Rocky Mountains eastward. On the other hand, in the southern districts, from Texas eastward, the increasing tendency during August of tropical hurricanes to visit this region, as compared with July, with their attendant low barometric pressure, causes a slight average decrease in pressure from the July values in that region. On the Pacific coast the continued warmth over the land areas, and the further heating of the adjacent ocean cause, on the average, a considerable lowering of the pressure of August from the July values.

During August, 1922, the average pressure was lower than that for the preceding month in nearly all districts, but particularly so over the Gulf States and in the far Northwest.

Compared with the normal the average pressure was higher over most central and southern districts, and also from the Great Lakes eastward, the greatest excesses appearing from the middle Rocky Mountains westward. From the middle Mississippi Valley northwestward into the Canadian Provinces the average pressure was slightly less than normal, and there were small areas along the Atlantic and Gulf coasts with averages likewise less than normal.

The relative position of the high and low pressure areas was in accordance with the condition usually existing during the warmer period of the year, and the resultant